TREATMENT OF DIARRHOEA USING ETHNO-MEDICINAL PLANTS AMONG GOAT REARERS IN BARHIM COMMUNITY OF BATAGARAWA LOCAL GOVERNMENT AREA, KATSINA STATE

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ABSTRACT
The study assessed the use of ethno-medicinal plants in the treatment of diarrhoea among goat rearers in Barhim community. Participatory Rural Appraisal (PRA) methodology using paired wise ranking tools was adopted and need assessment was conducted in the community in March, 2024. Data were collected using structured questionnaire and Focus Group Discussion from 70 goat rearers. The study revealed that the major ethno-medicinal plants used were Khaya senegalensis (Mahogany) 62%, and Acacia nilotica (Gum Arabic tree) 20%. The ethno-medicinal plants were administered through oral routes and goat rearers reported that a significant decrease in diarrhoea incidence. The study recommended that the use of ethno-medicinal plants should be improved and integrated into conventional veterinary practices, goat rearers should be trained on the proper identification, preparation and administration of ethno-medicinal plants and further research should be carried-out to separate and identify the active compound for the anti-diarrhoeal properties.
Keywords: **Ethno-medicinal plants, Diarrhoea treatment, Goat rearers**

INTRODUCTION
Nigeria has the major small ruminant herds in Africa with about 73.8 million goats and 42.1 million sheep which are mostly native breeds (CSIRO, 2020). The livestock sub-sector contributed N221.13 billion (5.6%) to the country's Gross Domestic Product (GDP) in the first quarter of 2023 (CBN, 2023). Small ruminants (sheep and goats) occupy a vital part of livestock produced in Nigeria where they are raised mostly for meat, milk, skin and wool (Oni *et al.,*2022; Yusuf *et al.,* 2018).

The etiology of diarrhoea is multifaceted and includes communicable agents, poor management, reproductive circumstances, dietary changes, and host immune status (Diaz-Lee *et al*., 2011). Thus, diarrhoea continues to be the major therapeutic threat in small ruminant production systems (Grayson, 2011). Diarrhoea is the passageway of watery stools, usually at least three times in a 24-hour period (Njume and Goduka, 2012). It is a common mark of gastrointestinal diseases brought on by a variety of microorganisms, including bacteria, viruses, and protozoa (Unaeze *et al.,* 2017). Poor sanitation and hygiene are thought to be the root cause of 88% of deaths associated with diarrhoea (Webb and Cabada, 2018).

Ethno-medicinal treatment of livestock diseases is usually practiced in African nations (Oda *et al.,* (2024; Traor´e *et al.,* 2020) and worldwide (Gao *et al.,* 2024 and Mertenat *et al.,* 2020). In rural and undeveloped areas, there is a deficiency or limited access to improved veterinary services to cater for livestock healthcare requirements, and ethno-medicinal remedies remain a prominent corresponding medical practice for treating diseases (Eiki *et al.,* 2021, Gao *et al.,* 2024). The use of ethno-medicinal plants is an integral part of veterinary services for the treatment of livestock in Nigeria, and various natural-based products have been documented to be used to treat livestock ailments (Awuni 2020; Naandam and Idorisu, 2010).

Through documenting plant species, ethnoveterinary medicine plays a vital role in maintaining traditional knowledge about therapeutic plants and preserving them for future generations (Eiki *et al.,* 2021). In addition to offering a chance for new drug discovery from beneficial natural products (Mertenat *et al.,* 2020), ethnoveterinary inventory can highlight the well-known species of interest to communities to assess the threat to conservation accurately (Morvin *et al.,* 2014: Albuquerque *et al.,* 2006). In a study conducted by Fasae and Adenuga (2017) on medicinal plants used for diarrhoea treatment in sheep and goats among smallholders in farm settlements of Ogun state, Nigeria. The study revealed that diarrhoea is a major disease problem in sheep and goats. Farm animals are mostly managed on the free-range/extensive and semi-intensive systems in the Nigerian agricultural system (Oni et al. 2022). Bareetseng (2022) stated that about 70 – 80% of the African population depend on plants for the treatment of human and livestock diseases. This is because they are easily accessible, cheap, economically viable and culturally suitable (Chakale *et al.,* 2022). The major objective of the study was to assess the treatment of diarrhoea using ethno-medicinal plants among goat rearers in Barhim community of Batagarawa Local Government Area of Katsina State.

MATERIALS AND METHODS

Study Area

The study was conducted in Barhim community of Batagarawa Local Government Area in Katsina state, Nigeria. Barhim is a rural area where agricultural forms the backbone of the local economy and a soil type is a sandy or sandy-loam soil supporting the growth of various crops and livestock.

Data collection

A need assessment was carried out in Barhim community of Batagarawa area in March 2024, to interact with goat rearers aimed at knowing their problems on the goat rearing. The problems stated by the goat rearers included Beri-Beri, Gumboro, Diarrhoea, Inadequate Feeds and Tuberculosis. However, a Participatory Rural Appraisal tool (pair ranking and Focus Group Discussion were used to conduct need assessment with goat rearers. The Diarrhoea emerged first with high scores from the problems stated by the goat rearers during Focus Group Discussion.

Sampling procedure

A Purposive sampling technique was used to select a 70 goat rearers to serve as a sample size for the study. While participatory Rural Appraisal methodology using a pair, wise ranking tool was employed to carry out need assessment that served as a basis for this research work.

Statistical analysis

Data collected were analysed using descriptive statistics such as mean, frequency, and percentage.

RESULTS AND DISCUSSION

Table 1 revealed that the maximum and minimum age of goat rearers was 19 and 45 years with an average of 38 years. This shows that the goat rearers were young and actively engaged in goat production. Herding experience shows that goat rearers had 1 and 15 years as minimum and maximum years of experience in goat rearing with an average of 5 years. The average herd size of goat rearers was 7 goats and average amount of credit received was ₦ 25,000 in the study area.

Ethnomedicinal plants used in the treatment of diarrhoea in goat

The study revealed that Khaya 62% and Acacia 20% was the major plants used in the treatment of diarrhoea in goat. Others plants used in the treatment of diarrhoea in goat include Mango 8%, Neem 5% and Baswella 5% (Table 2).

Causes of Diarrhoea

Figure 1 indicated that contaminated feeds and water with 44% was the major causes of diarrhoea of goat in the study area followed by immature green fodder 27%, micro-organisms 22% and least causes was climate changes 7%.

Table 1: Continuous variables

Variables	Minimum	Maximum	Mean
Age (Years)	19	45	38
Herding experience (Years)	1	15	5
Herd size (Number)	5	15	7
Amount of credit received (Naira)	30000	100000	25000

Source: Field survey, 2024

Table 2: Ethnomedicinal plants used in the treatment of diarrhoea in goat

Plants	Frequency	Percentage
Mahogany	43	62
Gum Arabic	14	20
Neem	4	5
Mango tree	6	8
Boswellia	3	5
Total	70	100

Source: Field survey, 2024

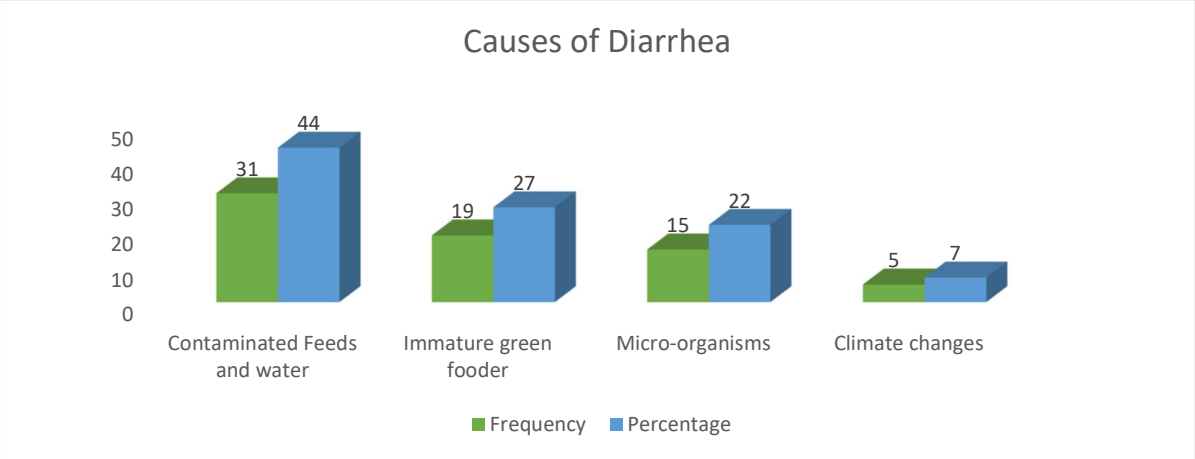

Figure 1: Causes of Diarrhoea

Guide the goat rearers on formulation of ethnomedicinal plants for diseases treatment

The materials needed for the formulation include the following:

Boswellia Zalzielli (Hano), *Khaya Senegalensis* (Madaci), *Acacia Nilotica* (Bagaruwa), Maize offal aruel, Mortar and Pestle, Gruel made from millet (Tsari), Improvised Fire wood. Pot, Water, Salt, 1 litre galloon, open plastic container.

The researchers demonstrated to the goat rearers how to mix the medicinal substance in both drinking water and feeds for the animals using the following steps: -

Step I: Small quantity of maize offal (Dusa) is mixed, water is added small quantity of Boswellia delzielli (hano) is added to, for prevention of coccidiosis and diarrhoea.

Step II: Small quantity of pounded leaves of *Acacia nilotica* (Bagaruwa) is added to gruel (tsari) made of mixture of water and brand of millet which is used as drinking water for the animal to serve as a treatment for prophylaxis and therapy.

Step III: Involved the use of stem bark of *Khaya senegalensis* (madaci). The bark is boiled with 1litre of water, small quantity of salt is added and used for the treatment of worms or deworming the substances is to be administered to animals on empty stomach in the morning before feeding.

Table 3: Plant collected, processed and used in the treatment of parasitic diseases of livestock

S/N	Botanical Name	Vernacular Name	Diseases treated for	Preparation and Administration
1	*Boswellia dalzielli*	Ararrabi or Hano	Coccidiosis and Diarrhoea	Pound dried stem bark and add to drinking water for 2-3 days or Boil together stem barks and Durmi gamji and give in drinking water or pound the fresh leaves and squeeze into drinking water.
2	*Khaya senegalensis*	Madaci	Diarrhoea, cough intestinal worm, weight loss.	Decoction alone or mixed with salt is administered orally once daily against worm's treatment on empty stomach is recommended.
3	A*cacia nilotica*	Bagaruwa	Gastrointestinal Parasite	Fresh Leaves pounded and added to gruel made from millet (Tsari) which animal drink freely. The preparation is used for prophylaxis and for therapy.

CONCLUSION AND RECOMMENDATIONS

It was revealed that contaminated feeds and water was the major causes of diarrhoea in goat and Mahogany and Arabic gum was the major plants used in the treatment of diarrhoea in goat. Therefore, it could be recommended that the use of ethno-medicinal plants should be improved and integrated into conventional veterinary practices, goat rearers should be trained on the proper identification, preparation and administration of ethno-medicinal plants and further research should be carried-out to separate and identify the active compound for the anti-diarrhoeal properties.

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